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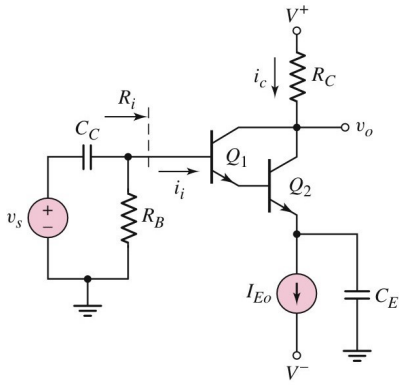
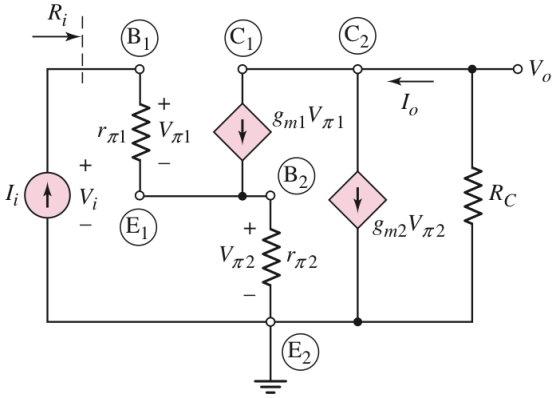
ECE322L -Homework 8 (100 points)
Assigned on Thursday, 03/26/2020-11 am
Due on Thursday, 04/09/2020-11 am

Calculate the output resistance of the amplifier below. Note that V_A is infinite for Q_1 and Q_2. What application would be most advantageous to use the amplifier below for? Justify your answer.



This is a Darlington pair configuration that provides larger current gain which are typically used in switches and delays.



From the small-signal equivalent circuit, we see that $g_{m_1}V_{\pi_1} = g_{m_1}r_{\pi_1}I_{in} = \beta_1 I_{in}$ and the output current is $I_{out} = g_{m_1}V_{\pi_1} + g_{m_2}V_{\pi_2}$. This gives us an overall current gain of $A_i = \dfrac{I_{out}}{I_{in}} \approx \beta_1\beta_2$ and means our output resistance is simply $\boxed{R_{out} = R_C}$.